

**Operating Instructions
Non-Contact Safety Switch
CES-AH-Co3-AH-SM (Unicode)**

More than safety.



EUCHNER

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Correct use

The **Coded Electronic Safety** switches series **CES** are safety devices for monitoring movable safety guards.

In combination with a safety guard, this safety component prevents dangerous machine movements from being performed for as long as the safety guard is opened. A stop command is triggered if the safety guard is opened during the dangerous machine function.

Before safety switches are used, a risk assessment must be performed on the machine, e.g., in accordance with:

- EN ISO 13849-1, Safety of machinery. Safety related parts of control systems. General principles for design
- EN ISO 14121-1, Safety of machinery. Risk assessment. Principles
- IEC 62061, Safety of machinery. Functional safety of safety-related electrical, electronic and programmable electronic control systems.

Devices in the system family CES-AH... have special safety outputs that are suitable for the direct switching of large loads. In appropriate applications it is therefore not necessary to connect power relays or contactors in between.

The device interrupts the supply of power to the load, if, e.g., the safety guard is open.

Correct use includes compliance with the relevant requirements for installation and operation, for example

- EN ISO 13849-1, Safety of machinery. Safety related parts of control systems. General principles for design
- EN 1088, Safety of machinery. Interlocking devices associated with guards. Principles for design and selection
- EN 60204-1, Safety of machinery. Electrical equipment of machines. General requirements
- EN 60947-5-3, Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with defined behaviour under fault conditions

The safety switch must be used only in conjunction with the designated CES actuators from EUCHNER. On the use of different actuators, EUCHNER provides no warranty for safe function.

Important!

- The user is responsible for the integration of the device into a safe overall system. For this purpose, the overall system must be validated, e.g. in accordance with EN ISO 13849-2.
- Correct use requires observing the permissible operating parameters (see Technical data).
- If a product data sheet is included with the product, the information on the data sheet applies in case of discrepancies with the operating instructions.
- It is only allowed to use components that are permissible in accordance with the table below.

Possible combinations for CES components

| Safety Switch | Actuator | | | |
|----------------|---|---|----------------------|-----------------------------|
| | CES-A-BBA 071 840 | CES-A-BCA 088 786 | CES-A-BPA 098 775 | CES-A-BRN-100251 100 251 |
| CES-AH-C03... | 20 | 20 | 22 | 27 |
| Key to symbols | 15 | Combination possible, typ. switch-on distance 15 mm | | |
| |  | Combination possible, guard locking for process protection | | |
| |  | Combination possible, guard locking for personal protection | | |
| | | Combination not permissible | | |

Exclusion of liability and warranty

In case of failure to comply with the conditions for correct use stated above, or if the safety instructions are not followed, or if any servicing is not performed as required, liability will be excluded and the warranty void.

General safety instructions

Safety switches fulfill personal protection functions. Incorrect installation or tampering can lead to fatal injuries to personnel.

Check the safe function of the safety guard particularly

- after any setup work
- after the replacement of a CES component
- after an extended period without use
- after every fault

Independent of these checks, the safe function of the safety guard should be checked at suitable intervals as part of the maintenance schedule.

Warning!

Danger of fatal injury in the event of incorrect connection or incorrect use.

- Safety switches must not be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.

On this topic pay attention in particular to the measures for reducing the possibility of bypassing from EN 1088:1995+A2:2008, Section 5.7.

The device is only allowed to be installed and placed in operation by authorized personnel

- who are familiar with the correct handling of safety components
- who are familiar with the applicable EMC regulations
- who are familiar with the applicable regulations on health and safety and accident prevention
- who have read and understood the operating instructions.

Important!

Prior to use, read the operating instructions and keep it in a safe place. Ensure the operating instructions is always available during mounting, setup and servicing. EUCHNER cannot provide any warranty in relation to the readability of the CD for the storage period required. For this reason you should archive a printed copy of the operating instructions. If you should lose the operating instructions, you can download this documents from www.EUCHNER.de.

System description

The safety switch **CES-AH-CO3-AH-SM** complies with the following safety requirements:

- Category 3 according to DIN EN ISO 13849-1
- Proximity device with self-monitoring type PDF-S according to EN 60947-5-3.
- Redundant design of the circuit in the unit with self-monitoring
- This means that the safety system still functions even if an internal component fails
- The switch state of the semiconductor outputs is continuously monitored internally

The **CES** non-contact safety switch consists of three components: coded actuator, evaluation unit and read head.

The evaluation unit is integrated into a housing with the read head.

Each actuator possesses a unique electronic coding and so is a unique element in the system used. The code in an actuator cannot be reprogrammed.

The actuator must be assigned to the safety switch by a teach-in process so that it is detected by the system. This unambiguous assignment ensures a particularly high level of protection against tampering.

The safety switch with integrated evaluation unit and read head is fastened to the fixed part of the safety guard.

Within the device, the operation of the two safety outputs is dual-channel.

The actuator attached to the movable part of the safety guard is moved towards the read head fitted in the safety switch by closing the door. When the switch-on distance is reached, power is supplied to the actuator by the inductive read head and data can be transferred.

The bit pattern read is compared with the code saved in the safety switch, if the data match the safety outputs are enabled.

Due to the combination of dynamic polling of the actuator and the redundant, diverse design of the safety electronics with the two feedback switching elements for each safety output, the safety switch will enter the safe state with every detectable fault.

The safety outputs shut down the safety circuits if the safety guard is opened. The state of the safety outputs is monitored internally by two microprocessors.

For the safety outputs to switch on, there must be a voltage of U_B on the START input. This voltage can be supplied either using a jumper (automatic start) or using a start button.

The safety switch has a redundant circuit design with self-monitoring. This means that the safety system is still effective even if a component fails.

The system is designed so that a failure will not result in the loss of the safety function. The occurrence of failures is detected by cyclic self-monitoring at the latest on the next demand to close the safety contacts (e.g. on starting).

Montage

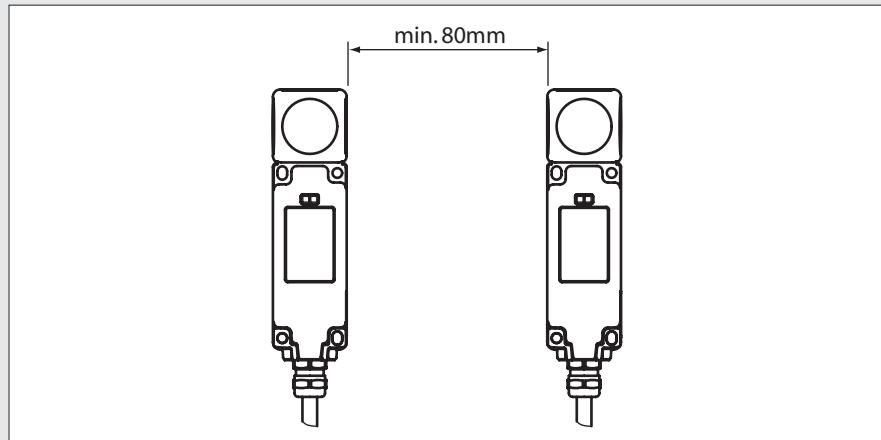
Caution!

Risk of damage to equipment as a result of incorrect installation. Safety switches must not be used as a mechanical end stop.

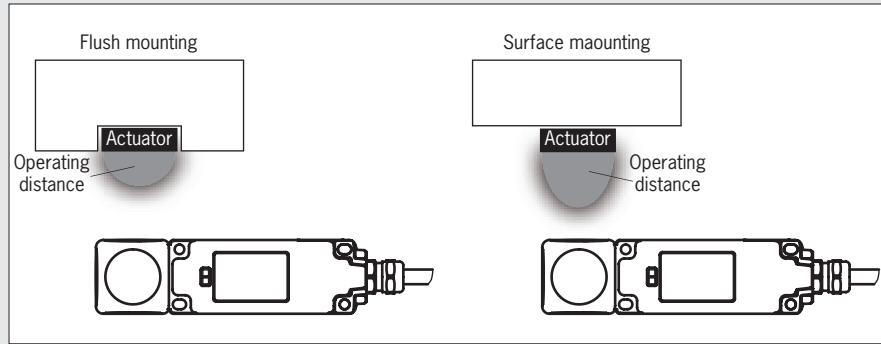
- Fit an additional end stop for the movable part of the safety guard.

Important!

- From the assured switch-off distance S_{ar} , the safety outputs are safely shut down.
- When mounting several safety switches, observe the stipulated minimum distance to avoid mutual interference.



- If the actuator is installed flush, the switching distance changes as a function of the installation depth and the safety guard material.



Note the following points:

- Actuator and safety switch must be easily accessible for inspection and replacement.
- Actuator and safety switch must be fitted so that
 - the front faces are at the minimum switch-on distance $0.8 \times S_{ao}$ or closer when the safety guard is closed (see section *Operating distances*). For a side approach direction for the actuator a minimum distance must be maintained so that the operating distance of the side lobes is not entered (see operating distance for the actuator).
 - when the safety guard is open up to the distance S_{ar} (assured switch-off distance), a hazard is excluded.
 - the actuator is positively mounted on the safety guard, e.g. by using the safety screws included.

Electrical connection

General notes

Caution!

- Risk of damage to equipment or malfunctions as a result of incorrect connection.
- To avoid faults, the cable must be laid with protection.
- The power for the operating voltage and for the inputs +LA and +LB must be provided from a common power supply.
- All the electrical connections must either be isolated from the mains supply by a safety transformer according IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures.
- With inductive loads there can be voltage spikes of up to -50 V lasting several milliseconds on switching off the outputs.
- To prevent overvoltages on the inputs and outputs for the safety circuits, inductive loads must be connected with free-wheeling diodes (see Connection examples page 12).
- Power devices which are a powerful source of interference must be installed in a separate location away from the input and output circuits for signal processing. The cable routing for safety circuits should be as far away as possible from the cables of the power circuits.

Test pulses, pulsing and power control

Important!

- In operation the device regularly switches off the safety outputs for approx. 6 ms to check the safe switching function. The loads connected must tolerate this behavior.
- A load connected is controlled using the safety paths +LA/LA and +LB/LB. The control voltage can be pulsed for power control.
- Do not use a control system with pulsing to test the output cables or switch off the pulsing function in your control system.

Behavior in case of faults

Attention!

- In the event of a fault in the safety switch, the safety circuit is switched off and the DIA LED illuminates red.
- After approx. 5 s. the device performs a re-start.

Important!

If the device does not appear to function when operating voltage is applied (e.g. green STATE LED does not flash), the safety switch must be returned unopened to the manufacturer.

Automatic restart and start button

Pay attention to the notes for the following applications:

Automatic start, with a jumper (+24 V are continuously present at the START input)

- ⇒ The device restarts automatically after faults.

Manual start (start via a start button)

- ⇒ Prior to each restart the start button must be pressed
- ⇒ A sticking start button (fault due to welding etc.) is not detected by the device and results in an automatic restart.

Attention!

Danger due to automatic start / restart.

An automatic start / restart can occur:

- ⇒ On closing the safety guard
- ⇒ On switching on the power supply
- ⇒ On automatic restart after the detection of a fault
- ⇒ Check carefully which start mode is suitable for your application.
- ⇒ Check whether additional measures are necessary to prevent an automatic restart.

Safety in case of faults

- ⇒ The operating voltage U_B is reverse polarity protected.
- ⇒ The contacts +LA/LA and +LB/LB are short circuit-proof and protected against reverse polarization.
- ⇒ To prevent switching on of the load connected in the case of a short circuit between LA or LB and the operating voltage U_B , the cables must be laid rigidly and with protection.

Fuse protection for power supply

The power supply must be provided with fuse protection depending on the current required for the outputs. If both outputs (LA and LB) are used, protect with max. 10 A fuse.

Voltage drop on cable and switch

If a load is applied to the outputs, voltage drops will occur on the supply cables and on the switch.

The voltage drops are to be taken into account during the calculation of the power available in the load connected.

| Parameter | Value | Unit |
|---|-------|------|
| Maximum resistance of an output path | 250 | mΩ |
| Resistance for further connection cable (e.g. 7 x 1 mm ² , supply and return wire) | 25 | mΩ/m |

Other connection resistances are to be taken into account as necessary.

Calculation example

- 10 m cable from the switch to the supply / load
- Supply voltage on the 24 V connection
- Load on channel A: 1 A
- Load on channel B: 4 A

For channel A:

- Voltage drop on the switch
- $$\Delta U_1 = R \times I = 250 \text{ m}\Omega \times 1 \text{ A} = 250 \text{ mV}$$
- Voltage drop on the cable
- $$\Delta U_2 = R_l \times I \times I = 25 \text{ m}\Omega/\text{m} \times 10 \text{ m} \times 1 \text{ A} = 250 \text{ mV}$$
- Voltage at the load

$$U = U_B - \Delta U_1 - \Delta U_2 = 24 \text{ V} - 0.25 \text{ V} - 0.25 \text{ V} = 23.5 \text{ V}$$

For channel B:

- Voltage drop on the switch
- $$\Delta U_1 = R \times I = 250 \text{ m}\Omega \times 4 \text{ A} = 1 \text{ V}$$
- Voltage drop on the cable
- $$\Delta U_2 = R_l \times I \times I = 25 \text{ m}\Omega/\text{m} \times 10 \text{ m} \times 4 \text{ A} = 1 \text{ V}$$
- Voltage at the load

$$U = U_B - \Delta U_1 - \Delta U_2 = 24 \text{ V} - 1 \text{ V} - 1 \text{ V} = 22 \text{ V}$$

Connection cables and plug connectors

Caution!

Risk of damage to equipment or malfunctions as a result of incorrect connection cables.

- Use EUCHNER connectors.
- If other connection components are used, the following recommendations apply. EUCHNER provides no warranty for safe function in case of failure to comply with these requirements.
- The maximum cable length should not exceed 50 m.

Recommended connection cable:

e.g. LiYY 7 x 1mm²,
Ölflex classic 400P 7 x 0.75

Mating connector for the evaluation unit:

EUCHNER M23, 9-pin, cable cross-section max. 1 mm² order no. 106 597

Alternative e.g.

Coninvers order no. RC-09S1N121600, cable cross-section max. 1 mm²

Important!

It is imperative you use the original tools from the connector manufacturer for assembly and follow the assembly instructions from the connector manufacturer.

Connector assignment

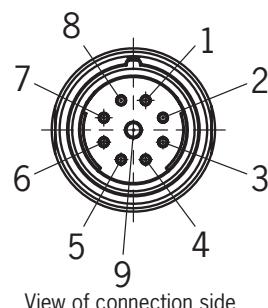


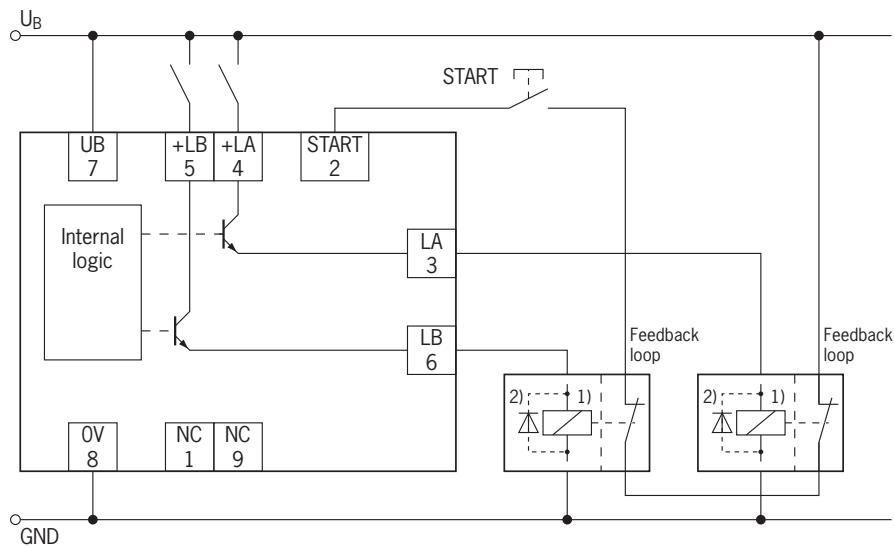
Figure 1: Connector assignment safety switch CES-AH-C03-AH-SM

| Pin | Designation | Description |
|-----|-------------|--------------------------|
| 1 | NC | Not used * |
| 2 | Start | Start input |
| 3 | LA | Safety output, channel 1 |
| 4 | +LA | Input for channel 1 |
| 5 | +LB | Input for channel 2 |
| 6 | LB | Safety output, channel 2 |
| 7 | UB | Power supply, DC 24 V |
| 8 | 0 V | Ground, DC 0 V |
| 9 | NC | Not used * |

* The unused connection pins are not allowed to be connected by the user!

Connection example

Within the device, the shutdown of the two outputs LA and LB is dual-channel. As such, each of the outputs represents a separate safety output.



- 1) Load, e.g. valve coil, DC motor, Ohmic load etc.
- 2) In case of inductive loads, it is imperative free-wheeling diodes are used to protect the outputs on the safety switch.

Figure 2: Connection example with start button and feedback loop

Attention!

- A short circuit between the cables on the safety outputs LA and LB and another cable must be prevented.
- In certain circumstances, a failure exclusion as per EN 13849-1, section 7.3 can be applied, see also EN 13849-2, section D.5.2.
- The CES-AH represents a subsystem as per EN 13849-1 and complies with PL d. To integrate the switch in a category 3 structure, it is necessary to monitor the downstream load (the feedback loop must be monitored).
- This example shows only an excerpt that is relevant for connection of the CES-AH system. The example illustrated here does not show complete system planning. The user is responsible for safe integration in the overall system.

Setup

LED indicators

| LED | Color | State | Significance |
|-------|-------|-------------|---|
| STATE | green | illuminated |  Normal operation |
| | | flashing |  Teach-in operation or Power Up (for further signal function see status table) |
| DIA | red | illuminated | - Internal electronics fault - Fault at the inputs/outputs |

Teach-in function for actuator

The actuator must be allocated to the safety switch using a teach-in function before the system forms a functional unit.

During a teach-in operation, the safety outputs are in high-resistance state, i.e. the system is in the safe state.

Important!

- The safety switch disables the code of the previous actuator if teach-in is carried out for a new actuator. Teach-in is not possible again immediately for this actuator if a new teach-in process is carried out. The disabled code is deleted again in the safety switch only after a third code has been taught.
- The safety switch can only be operated with the last actuator taught.
- If the switch detects an actuator which has already been taught when in teach-in standby state, this state is ended immediately and the switch changes to normal state.
- The actuator being taught is not activated if it is within the operating distance for less than 60 s.

Carrying out teach-in for a new actuator

1. Apply operating voltage to the safety switch.
 - ⇒ The green LED flashes quickly (approx. 10 Hz)
A self-test is performed during this time (approx. 3 s). After this, the LED flashes cyclically three times and signals that it is in standby state for teach-in.
Standby-state for teach-in remains active for approx. 3 minutes.
2. Move new actuator to the read head (observe distance < S_{ao}).
 - ⇒ Teach-in operation starts, green LED flashes (approx. 1 Hz). During teach-in, the safety switch checks whether the actuator is a disabled actuator. If this is not the case, the teach-in operation is completed after approx. 60 seconds, the green LED goes out. The new code has been saved, the old code disabled.
3. To activate the new actuator code from the teach-in operation in the safety switch, the operating voltage to the safety switch must then be switched off for min. 3 seconds.

Functional check

After installation and any fault, the safety function must be fully checked. Proceed as follows:

Warning!

Danger of fatal injury as a result of faults in installation and functional check.

- Before carrying out the functional check, make sure that there are no persons in the danger area.
- Observe the valid accident prevention regulations.

1. Switch on operating voltage.

- The safety switch carries out a self-test.
The green STATE LED flashes for 3 s with 10 Hz.
The STATE LED then flashes at regular intervals.

2. Close all safety guards.

- The machine must not start automatically.
- The green STATE LED illuminates continuously.

3. Enable operation in the control system.

4. Open the safety guard.

- The machine must switch off and it must not be possible to start it as long as the safety guard is open.
- The green LED STATE flashes at regular intervals.

Repeat steps 2-4 for each safety guard.

System status table

| Operating mode | Actuator/ door position | Safety outputs LA and LB | LED indicator output | State | |
|-------------------------|----------------------------|---|--|---|---|
| | | | STATE (green) | DIA (red) | |
| Self-test | X | off |  10 Hz (3 s) | ○ | Self-test after power up |
| Normal operation | closed | on |  | ○ | Normal operation, door closed |
| | open | off |  1 x | ○ | Normal operation, door open |
| Teach-in standby | open | off |  3 x | ○ | Door open, unit is ready for teach-in for another actuator (only short time after power-up) |
| Setup | closed | off |  1 Hz | ○ | Teach-in operation |
| | X | off |  | ○ | Positive acknowledgement after acknowledgement of teach-in operation |
| Fault display | X | off |  2 x |  | Overload (e.g. short circuit on a safety output) |
| | X | off |  3 x |  | Over-temperature |
| | X | off |  4 x |  | Output fault (e.g. fault on a switching element) |
| | X | off |  5 x |  | Internal fault (e.g. component faulty, data fault) |
| Key to symbols | | ○ | | LED not illuminated | |
| | |  | | LED illuminated | |
| | |  10 Hz (8 s) | | LED flashes for 8 seconds at 10 Hz | |
| | |  3 x | | LED flashes three times | |
| | | X | | Any state | |

Important!

If you do not find the displayed device status in the System status table, this indicates an internal device fault. In this case, you should contact the manufacturer.

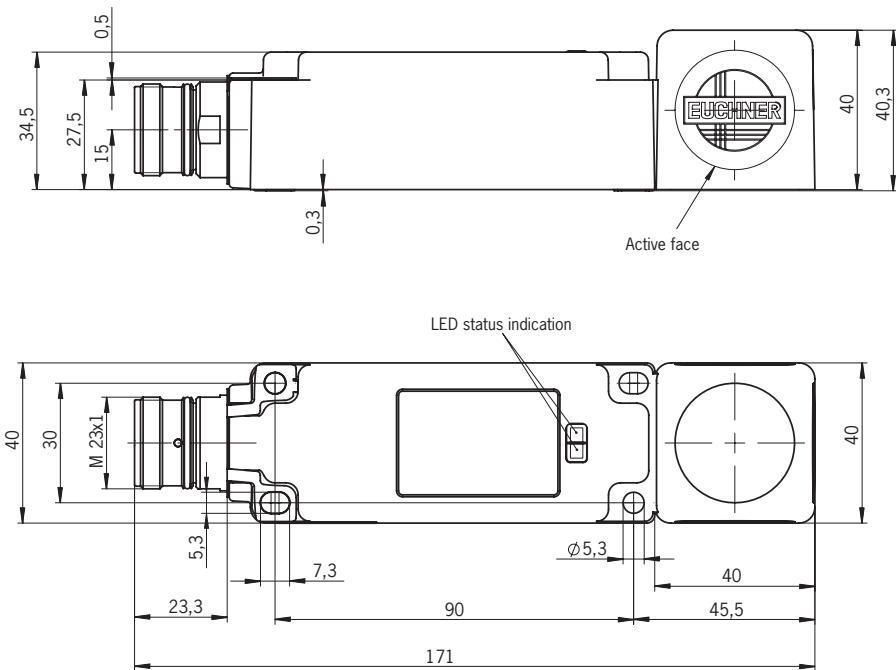
Technical data

Note!

If a product data sheet is included with the product, the information on the data sheet applies in case of discrepancies with the operating instructions.

Technical data for safety switch CES-AH-C03-AH-SM

| Parameter | min. | typ. | max. | Unit | | | | |
|---|---|---------|-------|------|--|--|--|--|
| Housing material | | Plastic | | | | | | |
| Dimensions | 40 x 40 x 171 | | | mm | | | | |
| Weight | 0.35 | | | kg | | | | |
| Ambient temperature at $I(LA) / I(LB) > 3 A$ | -20 | - | +55 | | | | | |
| Ambient temperature at $I(LA) / I(LB) < 3 A$ | -20 | - | +70 | °C | | | | |
| Storage temperature | -25 | - | +70 | | | | | |
| Degree of protection | IP67 | | | | | | | |
| Safety class | III | | | | | | | |
| Degree of contamination | 3 | | | | | | | |
| Installation position | Any | | | | | | | |
| Connection | M23 plug connector, 9-pin | | | | | | | |
| Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5%) | 20 | - | 28 | V DC | | | | |
| Current consumption (no load on outputs) | 150 | | | mA | | | | |
| External fuse (operating voltage U_B , +LA and +LB) | 0.25 | - | 10 | A | | | | |
| Power supply for load $U(+LA)/U(+LB)$ | | U_B | | V DC | | | | |
| Safety outputs LA/LB | Semiconductor outputs, p-switching, short circuit-proof | | | | | | | |
| - Output voltage $U(LA)/U(LB)$ ¹⁾ | | | | | | | | |
| HIGH $U(LA)$ | U_B - 1.5 | - | U_B | | | | | |
| HIGH $U(LB)$ | | | | V DC | | | | |
| LOW $U(LA)/U(LB)$ | 0 | - | 4 | | | | | |
| Testing of the outputs | | | | | | | | |
| - Test pulse length | - | - | 6 | ms | | | | |
| - Test interval | 10 | - | - | s | | | | |
| Switching current per safety output | 30 | - | 4000 | mA | | | | |
| Utilization category according to EN 60947-5-2 | DC-13 24V 4A Caution: outputs must be protected with a free-wheeling diode in case of inductive loads. | | | | | | | |
| Classification acc. to EN 60947-5-3 | PDF-S | | | | | | | |
| Start input START | | | | | | | | |
| HIGH | 8 | - | U_B | | | | | |
| LOW | 0 | - | 2 | V DC | | | | |
| Rated insulation voltage U_i | - | - | 75 | V | | | | |
| Rated impulse withstand voltage U_{imp} | - | - | 1.5 | kV | | | | |
| Resilience to vibration | According to EN 60947-5-2 | | | | | | | |
| Switching delay from state change ²⁾ | - | - | 260 | ms | | | | |
| Fault detection time ³⁾ | - | 0.12 | 15 | s | | | | |
| Difference time between the two safety outputs | - | - | 50 | ms | | | | |
| Ready delay ⁴⁾ | - | - | 3 | s | | | | |
| Dwell time ⁵⁾ | 0.5 | - | - | s | | | | |
| Switching frequency | - | - | 1 | Hz | | | | |
| Repeat accuracy R acc. to EN IEC 60947-5-3 | ≤ 10 | | | | | | | |
| Mounting distance between 2 switches or 2 actuators | 80 | - | - | mm | | | | |
| EMC protection requirements | In acc. with EN 60947-5-3 | | | | | | | |
| Reliability values according to EN ISO 13849-1 | | | | | | | | |
| Category | 3 | | | | | | | |
| Performance Level (PL) | d | | | | | | | |
| PFH_d | $1.03 \times 10^{-7} / h$ | | | | | | | |
| Mission time | 20 | | | | | | | |
| 1) Values at a switching current of 4 A without taking into account the cable lengths. | | | | | | | | |
| 2) Corresponds to the risk time according to EN 60947-5-3. This is the maximum switch-off delay for the safety outputs following removal of the actuator. | | | | | | | | |
| 3) The fault detection time is the time for the detection of an internal fault in the device. At least one of the switching elements on each safety output is opened during this process. | | | | | | | | |
| 4) After the operating voltage is switched on, the semiconductor outputs are switched off during the ready delay. | | | | | | | | |
| 5) The dwell time of an actuator inside and outside the operating distance must be at least 0.5 s to ensure reliable detection of internal faults in the evaluation unit (self-monitoring). | | | | | | | | |

Dimension drawing

Typical system times

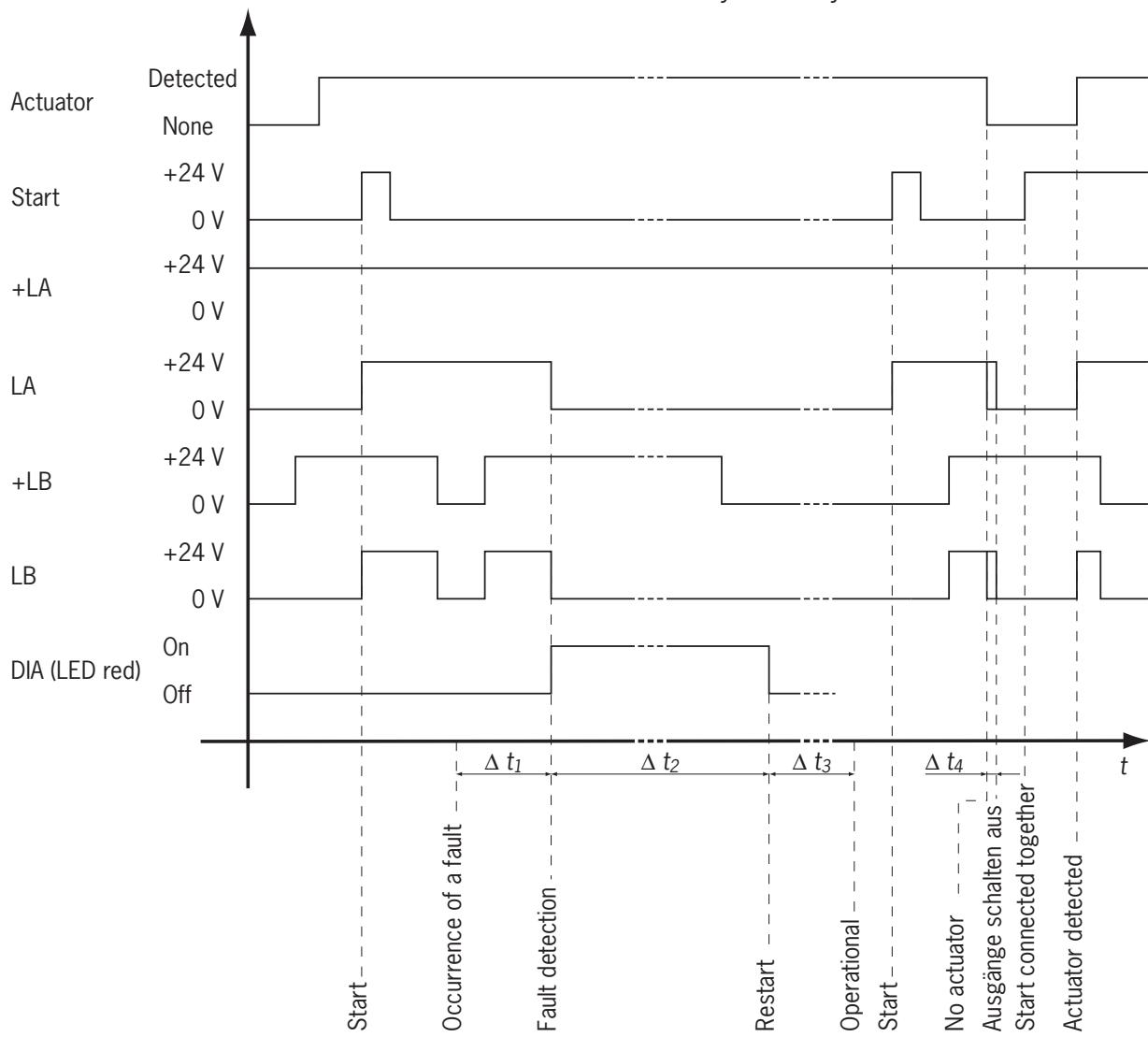
Ready delay: After switching on, the unit carries out a self-test for 3 s. The system is ready for operation only after this time.

Risk time according to EN 60947-5-3: If an actuator moves outside the operating distance, the safety outputs LA and LB on the corresponding safety switch are deactivated after a maximum of 260 ms.

Difference time: The safety outputs LA and LB switch with a slight time offset. They have the same signal state at the latest after a difference time of 50 ms.

System times for "restart after fault" and "normal operation"

Example application: UB = 24 V
+LA permanently connected to UB
+ LB switched by control system



Δt_1 = Fault detection time

Δt_2 = Fault time (5 s, switch spends this time in the fault state)

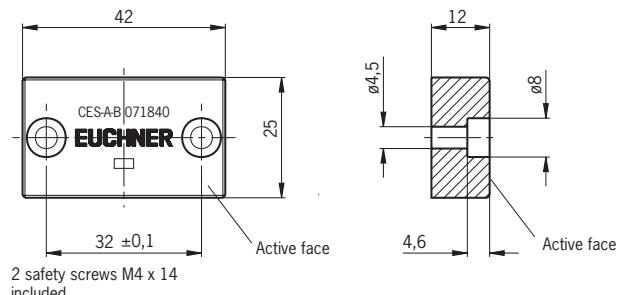
Δt_3 = PowerUp time (3 s)

Δt_4 = Risk time (\leq 260 ms, time from "no actuator" to "outputs switch off")

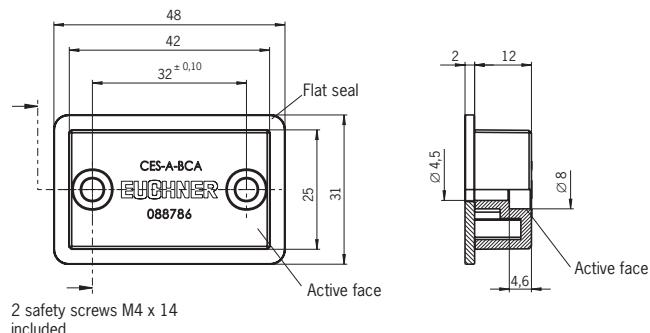
Figure 3: System times for individual switches

Technical data for actuator CES-A-BBA/CES-A-BCA

| Parameter | Value | Unit | | |
|---|---|------|------|----|
| | min. | typ. | max. | |
| Housing material - CES-A-BBA | Fortron, reinforced thermoplastic, fully encapsulated | | | |
| - CES-A-BCA | Plastic PE-HD without reinforcement, fully encapsulated | | | |
| Flat seal material (CES-A-BCA only) | Fluororubber 75 FPM 4100 | | | |
| Dimensions | 42 x 25 x 12 | mm | | |
| Weight | 0.02 | kg | | |
| Ambient temperature - CES-A-BBA | - 25 | - | + 70 | °C |
| - CES-A-BCA | - 25 | - | + 50 | |
| Degree of protection acc. to EN IEC 60529 | IP67/IP69K | | | |
| Installation position | Active face opposite read head | | | |
| Power supply | Inductive via read head | | | |

Dimension drawing CES-A-BBA

2 safety screws M4 x 14 included

Dimension drawing CES-A-BCA

2 safety screws M4 x 14 included

Switching distances

Operating distance for center offset $m = 0$

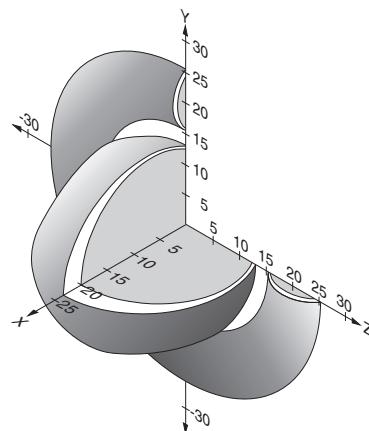
(only in combination with actuator CES-A-BBA/CES-A-BCA)

| Parameter | Value | Unit | | |
|---|-------|------|------|----|
| | min. | typ. | max. | |
| Switch-on distance | - | 20 | - | |
| Assured switch-on distance s_{ao} ¹⁾ | 18 | - | - | |
| Switching hysteresis ¹⁾ | 2 | 3 | - | |
| Assured switch-off distance s_{ar} | - | - | 40 | mm |

1) The values apply for surface installation of the actuator.

Typical operating distance

(only in combination with actuator CES-A-BBA/CES-A-BCA)

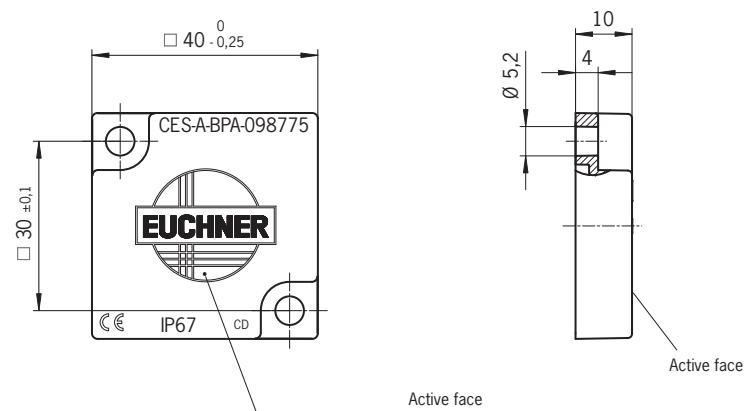


For a side approach direction for the actuator and safety switch, a minimum distance of $s = 4$ mm must be maintained so that the operating distance of the side lobes is not entered.

Figure 4: Typical operating distance

Technical data for actuator CES-A-BPA

| Parameter | Value | Unit | | |
|---|--------------------------------|------|------|----|
| | min. | typ. | max. | |
| Housing material | PBT | | | |
| Dimensions | 40 x 40 x 10 | mm | | |
| Weight | 0.025 | kg | | |
| Ambient temperature | - 25 | - | + 70 | °C |
| Degree of protection acc. to EN IEC 60529 | IP67/IP69K | | | |
| Installation position | Active face opposite read head | | | |
| Power supply | Inductive via read head | | | |

Dimension drawing

Switching distances

Operating distance for center offset $m = 0$

(Only in conjunction with actuator CES-A-BPA on surface mounting)

| Parameter | Value | Unit | | |
|--------------------------------------|-------|------------------|------|----|
| | min. | typ. | max. | |
| Switch-on distance | - | 22 ¹⁾ | - | mm |
| Assured switch-on distance s_{ao} | 18 | - | - | |
| Switching hysteresis | 1 | 2 | - | |
| Assured switch-off distance s_{ar} | - | - | 58 | |

1) On surface mounting on aluminum, in a non-metallic environment the typical switching distance increases to 30 mm.

Typical operating distance

(Only in conjunction with actuator CES-A-BPA on surface mounting)

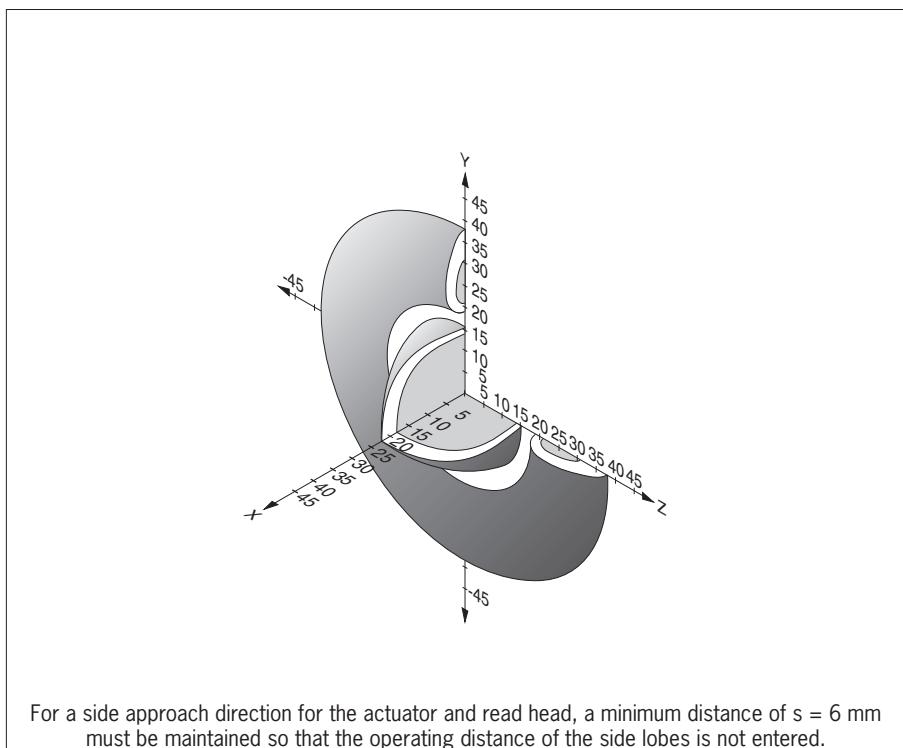
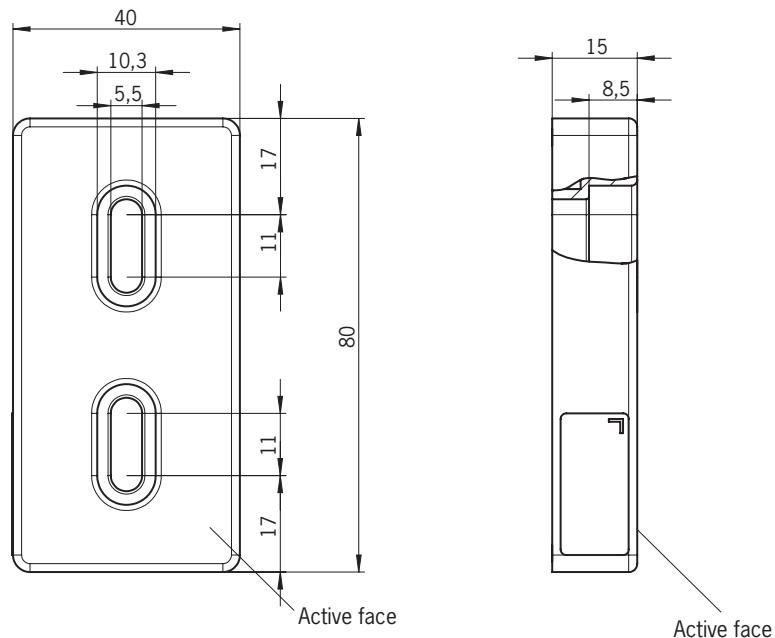


Figure 5: Typical operating distance

Technical data for actuator CES-A-BRN

| Parameter | Value | Unit | | |
|---|--------------------------------|------|------|----|
| | min. | typ. | max. | |
| Housing material | PPS | | | |
| Dimensions | 80 x 40 x 15 | mm | | |
| Weight | 0.06 | kg | | |
| Ambient temperature | - 25 | - | + 70 | °C |
| Degree of protection acc. to EN IEC 60529 | IP67 | | | |
| Installation position | Active face opposite read head | | | |
| Power supply | Inductive via read head | | | |

Dimension drawing

Switching distances

Operating distance for center offset $m = 0$

(only in combination with actuator CES-A-BRN)

| Parameter | min. | Value | max. | Unit |
|---|------|-------|------|------|
| Switch-on distance | - | 27 | - | mm |
| Assured switch-on distance s_{ao} ¹⁾ | 20 | - | - | |
| Switching hysteresis ¹⁾ | - | 3 | - | |
| Assured switch-off distance s_{ar} | - | - | 75 | |

1) The values apply for surface installation of the actuator on steel.

Typical operating distance

(Only in conjunction with actuator CES-A-BRN on surface mounting on steel)

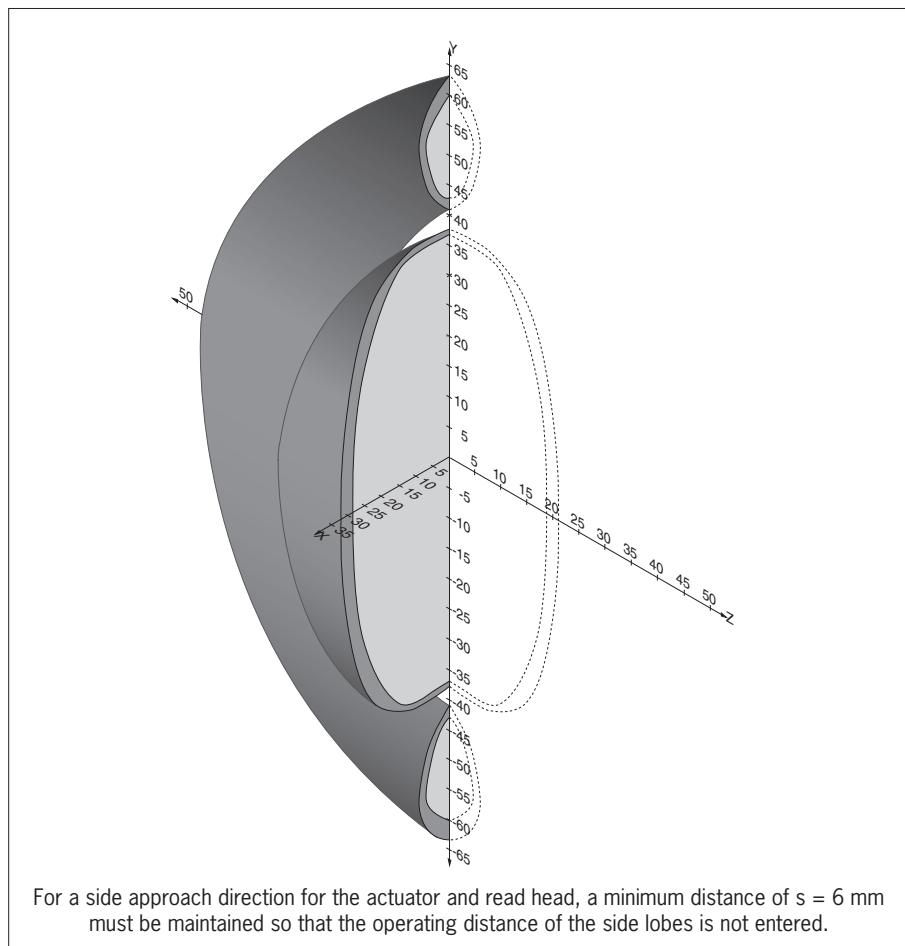


Figure 6: Typical operating distance

Ordering information and accessories

| Designation | Version | Order no. |
|---------------------------------------|---------------|-----------|
| Safety Switch CES-AH-Co3-AH-SM-106300 | Unicode | 106 300 |
| Actuator BBA | 42 mm x 25 mm | 071 840 |
| Actuator BCA | 42 mm x 25 mm | 088 786 |
| Actuator BPA | 40 mm x 40 mm | 098 775 |
| Actuator BRN | 80 mm x 40 mm | 100 251 |
| Mating connector for evaluation unit | M23 9-pin | 106 597 |

Inspection and service

Warning!

Loss of the safety function because of damage to the system.
In case of damage, the related safety component must be replaced. The replacement of individual parts in a safety component is not permitted.

Regular inspection of the following is necessary to ensure trouble-free long-term operation:

- Check the switching function (see section *Functional check*)
- Check the secure fastening of the devices and the connections
- Check for soiling

No servicing is required, repairs to the device are only allowed to be made by the manufacturer.

Note!

The year of manufacture can be seen in the lower right corner of the rating plate.

Service

If service support is required, please contact:

EUCHNER GmbH + Co. KG
Kohlhammerstrasse 16
D-70771 Leinfelden-Echterdingen

Service telephone:

+49 711 7597-500

E-mail:

info@euchner.de

Internet:

www.euchner.de

Declaration of conformity

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EUCHNER GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen
Germany

EG-Konformitätserklärung
EC-Declaration of Conformity
CE-Déclaration de Conformité
CE-Dichiarazione di conformità
CE-Declaración de Conformidad

Original DE
Translation EN
Traduction FR
Traduzione IT
Traducción ES

109923-07-05/13

Die nachfolgend aufgeführten Produkte sind konform mit den Anforderungen der folgenden Richtlinien (falls zutreffend):
The beneath listed products are in conformity with the requirements of the following directives (if applicable):
Les produits mentionnés ci-dessous sont conformes aux exigences imposées par les directives suivantes (si valable)
I prodotti sotto elencati sono conformi alle direttive sotto riportate (dove applicabili):
Los productos listados a continuación son conforme a los requisitos de las siguientes directivas (si fueran aplicables):

| | | |
|-----|-------------|--|
| I: | 2006/42/EG | Maschinenrichtlinie |
| | 2006/42/EC | Machinery directive |
| | 2006/42/CE | Directive Machines |
| | 2006/42/CE | Directiva Macchine |
| | 2006/42/CE | Directiva de máquinas |
| II: | 2004/108/EG | EMV Richtlinie |
| | 2004/108/EC | EMC Directive |
| | 2004/108/CE | Directive de Compatibilité électromagnétique |
| | 2004/108/CE | Directiva EMV |
| | 2004/108/CE | Directiva CEM |

Die Schutzziele der Niederspannungsrichtlinie wurden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie eingehalten.
The safety objectives of the Low-Voltage Directive comply with Annex I, No. 1.5.1 of the Machinery Directive.
Les objectifs de sécurité de la Directive Basse Tension sont conformes à l'annexe I, No. 1.5.1 de la Directive Machines
Gli obiettivi di sicurezza della Direttiva Bassa Tensione sono conformi a quanto riportato all'allegato I, No. 1.5.1 della Direttiva Macchine
Los objetivos de seguridad de la Directiva de Bajo Voltaje cumplen con el Anexo I, No. 1.5.1 de la Directiva de Máquinas

| | |
|---|--------------------------------|
| Folgende Normen sind angewandt: <i>Following standards are used:</i> | a: EN 60947-5-3:1999 + A1:2005 |
| Les normes suivantes sont appliquées: <i>Vengono applicate le seguenti norme:</i> | b: EN 1088:1995+A2:2008 |
| | c: EN ISO 13849-1:2008 |
| | d: EN ISO 13849-2:2012 |
| Se utilizan los siguientes estándares: <i>Vengono applicate le seguenti norme:</i> | |

| Bezeichnung der Sicherheitsbauteile Description of safety components Description des composants sécurité Descrizione dei componenti di sicurezza Descripción de componentes de seguridad | Type Type Type Tipo Tipo | Richtlinie Directives Directive Direttiva Directivas | Normen Standards Normes Norme Estándares | Zertifikats-Nr. No. of certificate Numéro du certificat Número del certificado Número del certificado |
|--|--|--|--|---|
| Sicherheitsschalter Safety Switches Interrupteurs de sécurité Interruotore di sicurezza Interruptores de seguridad | CES-AP-CL2-AH-SF CES-AP-CR2-AH-SF CES-AP-CL2-CH-SF CES-AP-CR2-CH-SF CES-AP-CL2-AH-SB CES-AP-CL2-CH-SB CES-AP-CR2-CH-SB CES-AP-CL2-AH-Lxx CES-AP-CR2-AH-Lxx CES-AP-CL2-CH-Lxx CES-AP-CR2-CH-Lxx CES-AP-C01-CH-SA CES-AR-C01-AH-SA CES-AR-C01-CH-SA CES-AR-C01-EH-SA CES-AR-CL2-AH-SA CES-AR-CR2-AH-SA CES-AR-CL2-CH-SA CES-AR-CR2-CH-SA CES-AR-CL2-AH-SG CES-AR-CR2-AH-SG CES-AR-CL2-CH-SG CES-AR-CR2-CH-SG CES-AR-CL2-AH-Lxx CES-AR-CR2-AH-Lxx CES-AR-CL2-CH-Lxx CES-AR-CR2-CH-Lxx | | I, II a, b, c, d | ET 12056 |
| | | I, II a, b, c, d | ET 12084 | |
| | | I, II a, b, c, d | ET 12084 | |
| | | I, II a, b, c, d | ET 12066 | |



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| | | | | |
|------------|--------------|-------|------------|----------|
| Betätiger | CES-A-BLN-L2 | | | |
| Actuator | CES-A-BLN-R2 | I, II | a, b, c, d | ET 12056 |
| Actionneur | CES-A-BLN-U2 | | | ET 12066 |
| Azionatore | CES-A-BDN-06 | | | |
| Actuador | CES-A-BBA | | | |
| | CES-A-BCA | | | |
| | CES-A-BPA | | | |
| | CES-A-BDA-20 | I, II | a, b, c, d | ET 12084 |
| | CES-A-BRB | | | ET 10147 |
| | CES-A-BRN | | | |

Benannte Stelle
Notified Body
 NB 0340
 DGUV Test Prüf- und Zertifizierungsstelle Fachausschuss Elektrotechnik
 Organisme notifié
 Gustav-Heinemann-Ufer 130
 Sede indicata
 50968 Köln
 Entidad citada
 Germany

| Bezeichnung der Sicherheitsbauteile <i>Description of safety components</i> <i>Description des composants sécurité</i> <i>Descrizione dei componenti di sicurezza</i> <i>Descripción de componentes de seguridad</i> | Type <i>Type</i> <i>Type</i> <i>Type</i> <i>Tipo</i> | Richtlinie <i>Directives</i> <i>Directive</i> <i>Direttiva</i> <i>Directivas</i> | Normen <i>Standards</i> <i>Normes</i> <i>Norma</i> <i>Estándares</i> | Prüfbericht <i>Test report</i> <i>Rapport du test</i> <i>Rapporto di prova</i> <i>Informe de prueba</i> |
|--|--|--|--|---|
| Sicherheitsschalter <i>Safety Switches</i> <i>Interrupteurs de sécurité</i> <i>Finecorsa di sicurezza</i> <i>Interruptores de seguridad</i> | CES-AH-C.3... CES-AP-C.1... CES-I-AP-C04... CES-I-AR-C04... CES-FD-AP... | I, II I, II I, II I, II | a, b, c, d a, b, c, d a, b, c, d a, b, c, d | Euchner QS PB 21/2010 Euchner QS PB 76/2010 UQS 116783 UQS 119733 UQS 116784 |
| Auswertegerät <i>Safety Unit</i> <i>Analyseur</i> <i>Centralina</i> <i>Unidad de evaluación</i> | CES-AR-AES-12 | I, II | a, b, c, d | Euchner PB 53/2007 |

Leinfelden, Mai 2013

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